

TABLE 1  
2020 SEMI-ANNUAL AND ANNUAL MONITORING PROGRAM  
DELAWARE SAND & GRAVEL SUPERFUND SITE  
NEW CASTLE COUNTY, DELAWARE

Sample ID	Well Type/Purpose	Screened Unit	Screen Interval (ft-bgs)	Sampling Depth (ft-bgs)	Purging and Sampling Method	April 2020 Event	October 2020 Event	ACL Semi-Annual Monitoring Program and Western Lobe Monitoring	
						Routine Groundwater Monitoring			
						VOCs+II-1,4-dioxane, SVOCs+II-BCEE, d-Fe/Mn/Co, TAL Metals, Ammonia	VOCs+II-1,4-dioxane, SVOCs+II-BCEE, d-Fe/Mn/Co		
<b>DDA Low-Flow Extraction System Wells</b>									
B-4DR	Extraction - LFExS	Columbia	31-41	NA	no purge - direct draw	x	x	-	
BG-1	Extraction - LFExS	Columbia	22-42	NA	no purge - direct draw	x	x	-	
C-18D	Extraction - LFExS	Columbia	31-37	NA	no purge - direct draw	x	x	-	
C-19D	Extraction - LFExS	Columbia	38-43	NA	no purge - direct draw	x	x	-	
C-20D	Extraction - LFExS	Columbia	43-48	NA	no purge - direct draw	x	x	-	
C-2D	Extraction - LFExS	Columbia	29-40	NA	no purge - direct draw	x	x	-	
C-30	Extraction - LFExS	Columbia	27-37	NA	no purge - direct draw	x	x	-	
C-4D	Extraction - LFExS	Columbia	34-42	NA	no purge - direct draw	x	x	-	
<b>DDA Monitoring Wells within Containment Area</b>									
B-2D	Monitoring near BG-1 and C-2D	Columbia	36-46	41	submersible - low flow	x	-	-	
B-3D	Monitoring near BG-1 and C-4D	Columbia	38-45	41	submersible - low flow	x	-	-	
C-1D	Monitoring along Northern Boundary	Columbia	28-38	33	submersible - low flow	x	-	-	
C-22S	Monitoring above Columbia Clay	Columbia	30-38	36	submersible - low flow	x	-	-	
C-3D	Monitoring along Northern Boundary	Columbia	31-44	38	submersible - low flow	x	-	-	
MHW-1M	Monitoring near C-20D	Columbia	40-45	43	submersible - low flow	x	-	-	
MHW-1S	Monitoring near C-20D	Columbia	30.2-35.2	33	submersible - low flow	x	-	-	
PZ-6S	Monitoring near C-30 and Partition	Columbia	26-29	27	3x - bailer	x	-	-	
<b>DDA Monitoring Wells within Partition Area</b>									
P-4D	Monitoring - Partition	Columbia	26.5-36.5	31	submersible - low flow	x	-	-	
PZ-4-INT-R	Monitoring - Partition	Columbia	29-34	32	submersible - low flow	x	-	-	
PZ-6N	Monitoring - Partition	Columbia	30-33	31	3x - bailer	x	-	-	
<b>UPCUTZ Future Extraction System Area</b>									
DDA-05	Monitoring - Downgradient of DDA	UPCUTZ	54-64	59	submersible - low flow	x	-	-	
DDA-05-TZ-EXTR	UPCUTZ - Extraction Well	UPCUTZ	47-57	52	submersible - low flow	x	R	-	
DDA-06	Monitoring - Downgradient of DDA	UPCUTZ	46-56	51	submersible - low flow	x	-	-	
DDA-06-TZ-EXTR	UPCUTZ - Extraction Well	UPCUTZ	48-73	52	submersible - low flow	x	R	-	
GA-101	Monitoring - Northern DDA Boundary	Columbia	22-28	26	submersible - low lflow	A	A	-	
PZ-11-EXT	Monitoring - Northern DDA Boundary	Columbia	37-42	40	submersible - low flow	x	R	-	
<b>Well PW-1(U) Extraction System Area</b>									
DDA-02	Monitoring - Downgradient of DDA	UPA-Upper Sand	84-94	89	submersible - low flow	x	R	-	
DDA-07-TZ	Monitoring - Beneath DDA	UPCUTZ	44-49	47	submersible - low lflow	A	-	-	
DDA-08-TZ	Monitoring - Beneath DDA	UPCUTZ	49-59	54	submersible - low lflow	A	-	-	
DDA-08-US	Monitoring - Beneath DDA	UPA-Upper Sand	62-72	67	submersible - low lflow	A	-	-	
DDA-09-TZ	Monitoring - Downgradient of DDA	UPCUTZ	55-65	60	submersible - low flow	x	-	-	
DDA-12-TZ	Monitoring - Downgradient of DDA	UPCUTZ	39-54	47	submersible - low flow	x	-	-	
DDA-12-US	Monitoring - Downgradient of DDA	UPA-Upper Sand	67-77	72	submersible - low flow	x	R	-	
DDA-13-TZ	Monitoring - Downgradient of DDA	UPCUTZ	48-58	53	submersible - low flow	x	-	-	
DDA-14-TZ	Monitoring - Beneath DDA	UPCUTZ	49-59	54	submersible - low flow	x	-	-	
DDA-16-TZ	Monitoring - Downgradient of DDA	UPCUTZ	51-59	56	submersible - low flow	x	-	-	
DDA-16-US	Monitoring - Downgradient of DDA	UPA-Upper Sand	63-73	68	submersible - low flow	x	-	-	
DGC-2S	Monitoring - West of DDA	UPA-Upper Sand	50-70	60	submersible - low lflow	A	-	-	
DGC-7S	Monitoring - Near Inert Area	UPCUTZ	60-80	70	submersible - low flow	x	-	-	
MHW-1D	Monitoring - Beneath DDA	UPA-Upper Sand	65-75	70	submersible - low flow	x	R	-	
PW-1(U)	Extraction - PW-1(U)	UPA-Upper Sand	68-93	NA	no purge - direct draw	x	x	-	
<b>Wells DDA-10-US/DDA-21-US-EXTR Future Extraction System Area</b>									
DDA-03	Monitoring - Downgradient of DDA	UPA-Upper Sand	80-90	85	submersible - low flow	x	-	-	
DDA-10-US	Monitoring - Downgradient of DDA	UPA-Upper Sand	42-52	47	submersible - low flow	x*PFAS	x	-	
DDA-15-TZ	Monitoring - Beneath DDA	UPCUTZ	54-64	59	submersible - low flow	x	-	-	
DDA-15-US	Monitoring - Beneath DDA	UPA-Upper Sand	85-95	90	submersible - low flow	x	-	-	
DDA-19-TZ	Monitoring - East of Well PW-1(U)	UPCUTZ	60-67	63.5	submersible - low flow	x	x	-	
DDA-19-US	Monitoring - East of Well PW-1(U)	UPA-Upper Sand	66-73	69.5	submersible - low flow	x	x	-	
DDA-21-US-EXTR	UPA Upper Sand - Extraction Well	UPA-Upper Sand	57-72	65	submersible - low flow	A	A	-	
<b>New Wells Included for Baseline Groundwater</b>									
DDA-18-TZ	Monitoring - West of Well PW-1(U)	UPCUTZ	47-54	50.5	submersible - low flow	x	x	-	
DDA-18-US	Monitoring - West of Well PW-1(U)	UPA-Upper Sand	71-78	74.5	submersible - low flow	x	x	-	
DDA-20-TZ	Monitoring - Northeast of Well PW-1(U)	UPCUTZ	48-55	51.5	submersible - low flow	x	x	-	
DDA-20-US	Monitoring - Northeast of Well PW-1(U)	UPA-Upper Sand	81-87	84	submersible - low flow	x	x	-	
<b>Existing Wells Upgradient of Well PW-1(U) - Not Proposed for Sampling in 2020</b>									
DDA-01	Monitoring - Downgradient of DDA	UPA-Upper Sand	84-94	89	submersible - low lflow	R	-	-	
DDA-04	Head monitoring for PW-1(U)	UPA-Upper Sand	80-90	85	submersible - low lflow	-	-	-	
DDA-07-US	Monitoring - Beneath DDA	UPA-Upper Sand	63-73	68	submersible - low lflow	R	-	-	
DDA-11-LS	Monitoring - Downgradient of DDA	UPA-Lower Sand	105-115	110	submersible - low lflow	R	-	-	
DDA-11-US	Monitoring - Downgradient of DDA	UPA-Upper Sand	75-85	80	submersible - low lflow	R	-	-	
DDA-17	Monitoring - Downgradient of DDA	UPA-Upper Sand	67-77	72	submersible - low lflow	R	-	-	
DGC-2D	Monitoring - West of DDA	UPA-Lower Sand	105-115	110	submersible - low lflow	R	-	-	
DGC-5	Monitoring - Northern DDA Boundary	UPCUTZ	35-55	45	submersible - low lflow	R	-	-	
DGC-7C	Monitoring - Near Inert Area	Columbia	23-33	28	3x - bailer	R	R	-	
MW-45	Monitoring - East of DDA	UPA-US and LS	-	-	submersible - low lflow	-	-	-	
PZ-4-EXT	Monitoring - Northern DDA Boundary	Columbia	27-30	29	submersible - low lflow	R	R	-	
<b>NCC Sewer Discharge Monitoring Points</b>									
TTO	LFExS Combined Discharge	Columbia	NA	NA	no purge - direct draw	x	x	-	
PW-1(U) Discharge	Extraction - PW-1(U)	UPA-Upper Sand	NA	NA	no purge - direct draw	x	x	-	
<b>Well UPA-01-US-EXTR Area</b>									
UPA-01-US-EXTR	UPA Upper Sand - Extraction Well	UPA-Upper Sand	98-108	103	submersible - low flow	A	A	-	
UPA-105A-LS	Monitoring - Well UPA-01 Area	UPA-Lower Sand	120.5-127.5	124	submersible - low flow	x	x	-	
UPA-105A-TZ	Monitoring - Well UPA-01 Area	UPCUTZ	97-104	100.5	submersible - low flow	x	x	-	
UPA-105A-US	Monitoring - Well UPA-01 Area	UPA-Upper Sand	104-111	107.5	submersible - low flow	x	x	-	
UPA-105B-LS	Monitoring - Well UPA-01 Area	UPA-Lower Sand	120-127	123.5	submersible - low flow	x	x	-	
UPA-105B-TZ	Monitoring - Well UPA-01 Area	UPCUTZ	77-83	80	submersible - low flow	x	x	-	
UPA-105B-US	Monitoring - Well UPA-01 Area	UPA-Upper Sand	108-115	111.5	submersible - low flow	x	x	-	
RT-1-UP	Monitoring - Well UPA-01 Area	UPA-Upper Sand	91-101	100	submersible - low flow	x	x	-	
UPA-01	Monitoring - Well UPA-01 Area	UPA-Upper Sand	90-100	95	submersible - low flow	x	x	-	
<b>Well P-6-US-EXTR Area</b>									
P-6-US-EXTR	UPA Upper Sand - Extraction Well	UPA-Upper Sand	95-110	99	submersible - low flow	A	A	-	
UPA-101-LSA</td									

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						Routine Groundwater Monitoring			
						VOCs+II-1,4-dioxane, SVOCs+II-BCEE, d-Fe/Mn/Co, TAL Metals, Ammonia	VOCs+II-1,4-dioxane, SVOCs+II-BCEE, d-Fe/Mn/Co		
<b>Well BW-2 Area</b>									
UPA-108B-LS	Monitoring - Well BW-2 Area	UPA-Lower Sand	90-97	93.5	submersible - low flow	x	x	-	
UPA-108B-TZ	Monitoring - Well BW-2 Area	UPCUTZ	40-47	43.5	submersible - low flow	x	x	-	
UPA-108B-US	Monitoring - Well BW-2 Area	UPA-Upper Sand	69-76	72.5	submersible - low flow	x	x	-	
UPA-108C-US	Monitoring - Well BW-2 Area	UPA-Upper Sand	72-79	75.5	submersible - low flow	A	A	-	
UPA-109-LS	Monitoring - Well BW-2 Area	UPA-Lower Sand	133.5-140.5	137	submersible - low flow	A	A	-	
UPA-109-USA	Monitoring - Well BW-2 Area	UPA-Upper Sand	42-49	45	submersible - low flow	A	A	-	
UPA-109-USB	Monitoring - Well BW-2 Area	UPA-Upper Sand	80-87	84	submersible - low flow	A	A	-	
BW-2	Monitoring - Well BW-2 Area	UPA-Lower Sand	123-143	138	submersible - low flow	x	A	Semi-Annual (Apr&Oct)	
<b>New Wells Included for Baseline Groundwater</b>									
CA-102	Monitoring - Inert Area	Columbia	39-46	42.5	submersible - low flow	x	x	-	
CA-103	Monitoring - Inert Area	Columbia	26-33	29.5	submersible - low flow	x	x	-	
CA-106	Monitoring - Grantham South	Columbia	13-20	16.5	submersible - low flow	x	x	-	
CA-110	Monitoring - West of Site	Columbia	5-12	8.5	submersible - low flow	A	A	-	
CA-111	Monitoring - West of Site	Columbia	3-10	6.5	submersible - low flow	A	A	-	
UPA-103-LS	Monitoring - Inert Area	UPA-Lower Sand	116-123	119.5	submersible - low flow	x	x	-	
UPA-103-TZ	Monitoring - Inert Area	UPCUTZ	65-72	68.5	submersible - low flow	x	x	-	
UPA-103-US	Monitoring - Inert Area	UPA-Upper Sand	83-90	86.5	submersible - low flow	x	x	-	
UPA-110-US	Monitoring - West of Site	UPA-Upper Sand	51-58	54.5	submersible - low flow	A	A	-	
UPA-111-LSA	Monitoring - West of Site	UPA-Lower Sand	77-84	80.5	submersible - low flow	A	A	-	
UPA-111-LSB	Monitoring - West of Site	UPA-Lower Sand	109-116	112.5	submersible - low flow	A	A	-	
<b>Existing Wells Downgradient of Well PW-1(U) - Not Proposed for Sampling in 2020</b>									
BW-3	Monitoring	UPA-US and LS	50-135	92	submersible - low flow	R	-	Annual (Oct)	
DGC-11S	Monitoring - Eastern AoA Boundary	UPA-Upper Sand	70-50	75	submersible - low flow	R	-	-	
DGC-8C	Monitoring - Inert Area	Columbia	19-29	30	submersible - low flow	R	-	-	
DGC-8D	Monitoring - Inert Area	UPA-Lower Sand	108-118	117	submersible - low flow	R	-	-	
DGC-8S	Monitoring - Inert Area	UPA-Upper Sand	60-80	75	submersible - low flow	R	-	-	
MW-18	Monitoring - Wells MW-18/MW-34 Area	UPA-Upper Sand	80-90	85	peristaltic	R	R	Annual (Oct)	
MW-22N	Monitoring - ACL Western Lobe	UPA-Lower Sand	139-159	149	submersible - low flow	-	-	Semi-Annual (Apr&Oct), Western Lobe	
MW-22NU	Monitoring - ACL Western Lobe	UPA-Upper Sand	114-121	NA	submersible - low flow	-	-	Western Lobe	
MW-28	Former Extraction - ACL Eastern Lobe	UPA-US and LS	40-120	50	submersible - low flow	R	-	Annual (Oct)	
MW-29	Former Extraction - ACL Eastern Lobe	UPA-US and LS	34-113	39	submersible - low flow	R	-	Annual (Oct)	
MW-31	Former Extraction - ACL Eastern Lobe	UPA-US and LS	59-105	75	submersible - low flow	R	-	Annual (Oct)	
MW-34	Monitoring - Wells MW-18/MW-34 Area	UPA-US and LS	75-131.5	100	submersible - low flow	R	R	-	
MW-38N	Monitoring	UPA-US and LS	72-132	102	submersible - low flow	-	-	-	
MW-40	Monitoring	UPA-Lower Sand	110-140	125	submersible - low flow	-	-	Annual (Oct)	
MW-49N	Monitoring	UPA-US and LS	72-132	135	submersible - low flow	-	-	Semi-Annual (Apr&Oct)	
MW-54	Monitoring	UPA-Upper Sand	40-50	TBD - no log	submersible - low flow	-	-	-	
MW-56	Monitoring	UPA-Upper Sand	75-100	85	submersible - low flow	-	-	-	
MW-58	Monitoring	UPA-Upper Sand	65-110	75 and 95	submersible - low flow	-	-	-	
P-4	Monitoring - ACL Western Lobe	UPA-Upper Sand	115-125	120	submersible - low flow	-	-	Annual (Oct), Western Lobe	
P-4L	Proposed Monitoring - ACL Western Lobe	UPA-Lower Sand	138-145	NA	submersible - low flow	-	-	Western Lobe	
P-5U	Monitoring	UPA-Upper Sand	126-136	75	submersible - low flow	R	-	-	
RW-10	Former Extraction - ACL Western Lobe	UPA-Upper Sand	77-102	90	submersible - low flow	-	-	Western Lobe	
UPA-02S	Monitoring	UPA-Upper Sand	97-107	102	submersible - low flow	R	-	-	
UPA-112-LS	Potentiometric Head East of Site	UPA-Lower Sand	108-113	109.5	submersible - low flow	-	-	-	
UPA-112-TZ	Potentiometric Head East of Site	UPCUTZ	65-72	68.5	submersible - low flow	-	-	-	
UPA-112-US	Potentiometric Head East of Site	UPA-Upper Sand	76-83	79.5	submersible - low flow	-	-	-	
WL-1L	Monitoring - ACL Western Lobe	UPA-Lower Sand	120-127	NA	submersible - low flow	-	-	Western Lobe	
WL-1U	Monitoring - ACL Western Lobe	UPA-Upper Sand	87-94	NA	submersible - low flow	-	-	Western Lobe	
WL-2L	Monitoring - ACL Western Lobe	UPA-Lower Sand	131-138	NA	submersible - low flow	-	-	Western Lobe	
WL-2U	Monitoring - ACL Western Lobe	UPA-Upper Sand	109-116	NA	submersible - low flow	-	-	Western Lobe	
<b>AWC Monitoring Wells</b>									
AWC-E1	Former Production - Upgradient of AWC	UPA-Upper Sand	122-162	132	submersible - low flow	A	A	-	
AWC-E1	Former Production - Upgradient of AWC	UPA-Lower Sand	122-162	156	submersible - low flow	A	A	-	
AWC-E2	Former Production - Upgradient of AWC	UPA-Upper Sand	131-173	140	submersible - low flow	x	x	-	
AWC-E2	Former Production - Upgradient of AWC	UPA-Lower Sand	131-173	165	submersible - low flow	x	x	-	
AWC-K1	Monitoring - Eastern AoA Boundary	UPA-Lower Sand	135-173	160	submersible - low flow	x	x	-	
<b>AWC Extraction Wells - only extraction wells which are pumping at the time of the event can be sampled</b>									
AWC-2	Production Well	UPA-Lower Sand	122-160	NA	no purge - direct draw	-	-	-	
AWC-6R	Production Well	UPA-US and LS	100-140	NA	no purge - direct draw	x	x	-	
AWC-7	Production Well	UPA-US and LS	115-175	NA	no purge - direct draw	x	x	-	
AWC-G3R	Production - Southern AoA Boundary	UPA-US and LS	102-157	NA	no purge - direct draw	x	x	-	

**Notes:**

- 1) "x" indicates location will be sampled for indicated parameter(s)
- 2) "-" indicates location will not be sampled for indicated parameters and/or location was not included as a SAP Revision 2 sample location
- 3) \*PFAS indicates sampling location will be resampled for PFAS analysis due suspect data from October 2019.
- 4) April monitoring event represents a site-wide event and October monitoring event is limited to information needed for design
- 5) A synoptic round of water levels will be collected prior to sampling during each monitoring event.
- 6) AWC agreed to let the Golder sample AWC wells as part of semi-annual monitoring events beginning in October 2018.
- 7) Trip blanks will accompany each shipment of VOC samples (1 per day).
- 8) The following quality assurance/quality control (QA/QC) samples will be collected during each monitoring event at a rate of 1 per 20 primary samples: field duplicates, field equipment rinsate blanks, matrix spikes and matrix spike duplicates.
- 9) The LExS discharge is monitored on a semi-annual basis in accordance with the New Castle County Wastewater Discharge Permit requirements. The samples are analyzed for Total Toxic Organics (TTO) VOCs, TTO SVOCs, TTO pesticides, polychlorinated biphenyls (PCBs), biological oxygen demand (BOD), Inductively Coupled Plasma Mass Spectroscopy (ICP MS) metals (arsenic, cadmium, chromium, copper, lead, molybdenum, nickel, selenium, and zinc), mercury (cold vapor atomic absorption; CVAA), ammonia, total suspended solids (TSS), total cyanide and pH.
- 10) The PW-1(U) system discharge is monitored on a semi-annual basis in accordance with the New Castle County Wastewater Discharge Permit requirements. The samples are analyzed for VOCs, SVOCs, BOD, ICP MS metals (arsenic, cadmium, chromium, copper, lead, molybdenum, nickel, selenium, and zinc), mercury (CVAA), ammonia, TSS, cyanide and pH.